

CS325  
USER INTERFACE AND USER EXPERIENCE DESIGN  
Week 8

Dr Frank Guan

# Recap from last lecture

- Usability definition and dimensions
  - **Learnability**
  - **Visibility**
  - **Efficiency**
  - **Flexibility**
  - Errors and robustness
  - Memorability
  - Satisfaction

# Recap from last lecture

- UI design guidelines
  - Norman's Principles (6)
  - Shneiderman's Golden Rules (8)

# Prototyping

# Overview

- What is a Prototype?
- Storyboards
- Prototype Fidelity
- Paper Prototypes
- Video Prototypes
- Computer Prototypes
- Wizard of Oz Prototyping

# How to express early design ideas?

- Allow lots of flexibility for radically different designs
- No coding involved (yet)
- Must be fast!
- Cheap, simulate the design in a low-cost manner
- Promote valuable feedback

Facilitate iterative design and evaluation

# What is a prototype?

- Rapid approximation of a design idea used to gather feedback
- A limited representation of a product design

Prototyping is a strategy for efficiently dealing with things that are hard to predict

# Why prototype?

- Get feedback earlier and cheaper
- Experiment with alternative
- Easier to change or throw away

People cannot describe what they want,  
but they are quick to recognize what they do not like!

# Activities of prototyping

- Interactive exploration with envisioned product
- Clarifies vague requirements with concrete communication between stakeholders
- Answers questions and supports design decisions with forced reflection
- Tests feasibility & compatibility
- Sells product ideas
- Inspires innovation



prototyping the interaction experience for **Kodak's first consumer digital camera**  
(prototype by mat hunter and duncan kerr, IDEO)



COURTESY PALM

### PalmPilot wooden model, Jeff Hawkins, 1995

Jeff Hawkins tested the palmpilot's design with this model, using a chopstick for a stylus. He took pretend notes in meetings and counted the steps it took to perform common tasks

# Rights of a prototype

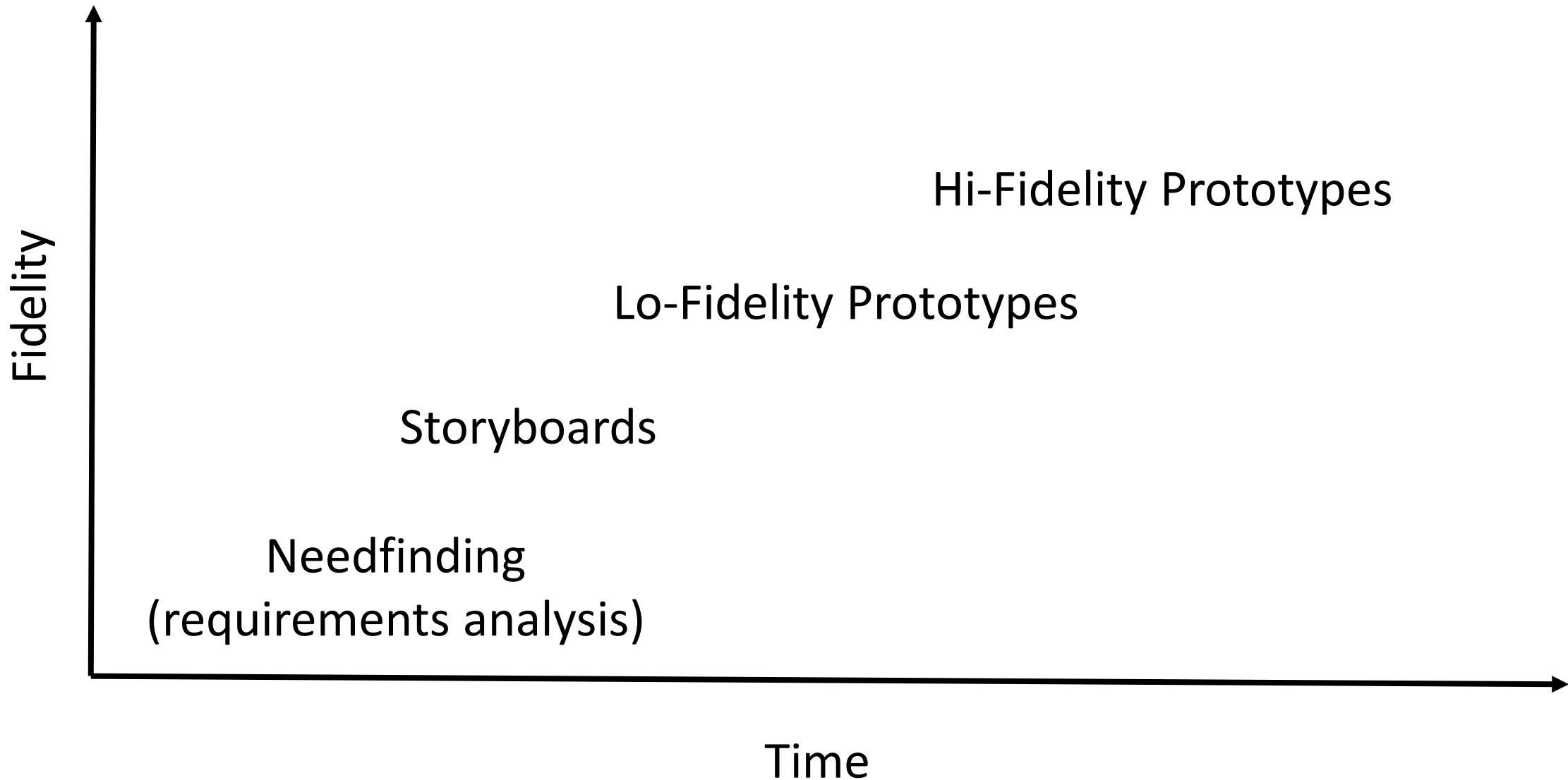
- Should not be required to be complete
- Should be easy to change
- Gets to retire

# What Do Prototypes Prototype?

**Feel** What might it look like?

**Implementation** What might it work like?

**Role** What might the experience be like?



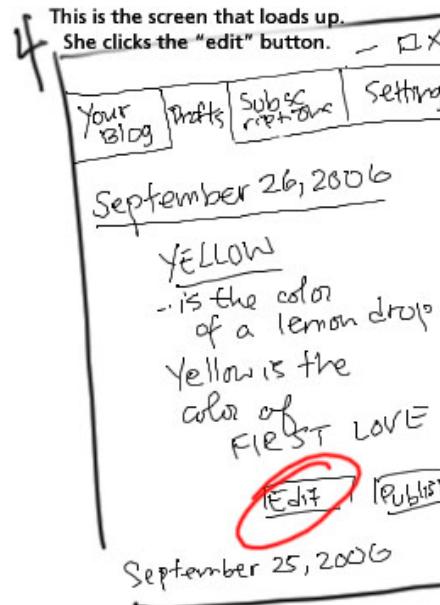
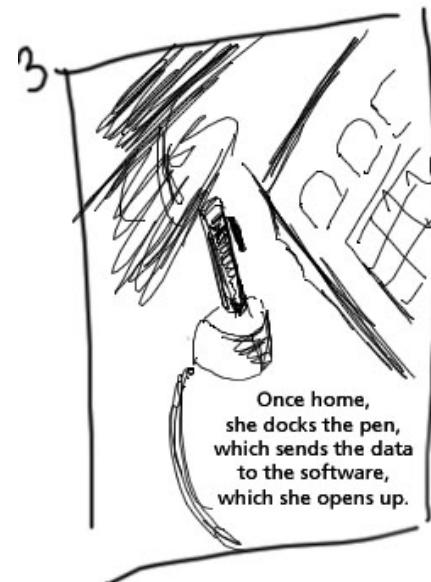
# Storyboards

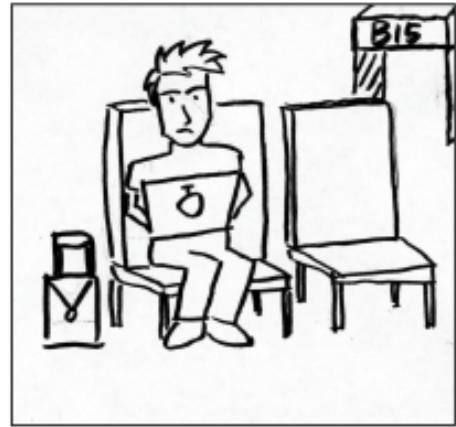
A pencil and paper simulation or walkthrough of system look and functionality

- Sequence of diagrams or drawings
- Series of scene sketches showing user progression through a task flow or use case
- Conveys key snap shots
- Often used with *scenarios* to bring detail

Not simply pretty pictures; A means of communicating ideas

## Storyboard #1: Creating + Modifying a Blog Entry

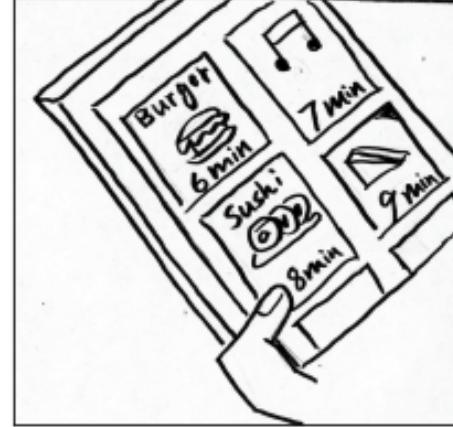




1. Jason's flight will start boarding  
in 45 minutes



2. Jason gets bored with the waiting,  
and wants to find something to do



3. He opens Airspect app to see  
things to do around him



4. He first goes to a local musician  
show, and decides to go to a bar



5. Jason gets an alert from his phone  
that his boarding is in 20 min



6. He goes back to his gate in 5 min,  
right in time for boarding

Ethan Zhang, Airspect

# Benefits of storyboarding?

- Holistic focus
  - Understand the workflow of the proposed system
  - Helps emphasize how an interface accomplishes a task
- Avoids commitment to a particular user interface (no buttons yet)
- Helps get all the stakeholders on the same page in terms of the goal
- Gather early feedback

# Storyboards Should Convey

## Setting

- People involved
- Environment
- Task being accomplished

## Sequence

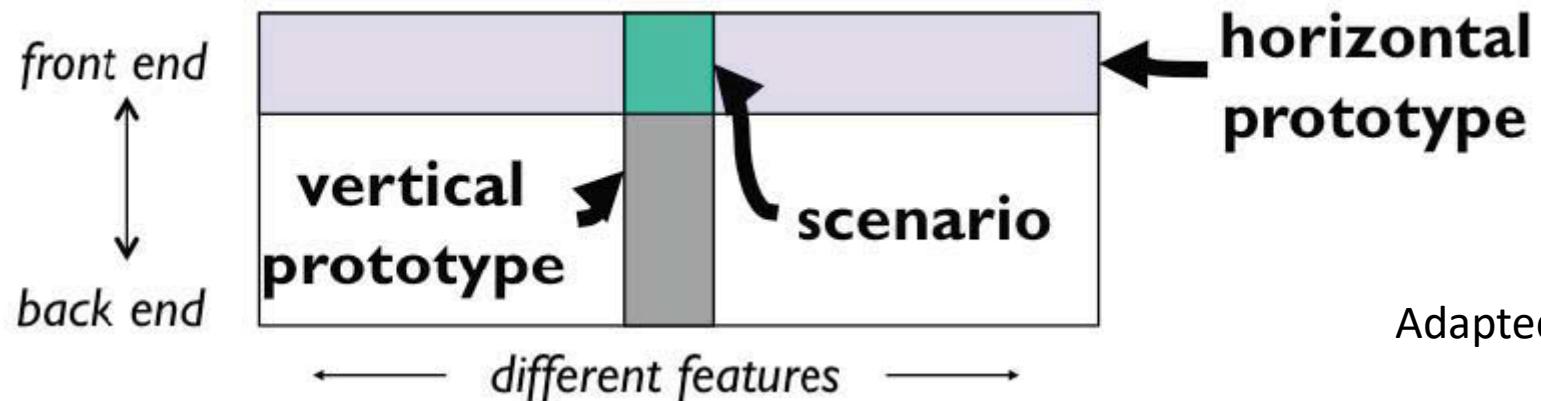
- What steps are involved?
- What leads someone to use the app?
- What task is being illustrated?

## Satisfaction

- What's motivates people to use this system?
- What does it enable people to accomplish?
- What need does the system fill?

# Fidelity is multidimensional

- Breadth: % of features covered
  - Only enough features for certain tasks
- Depth: degree of functionality
  - Limited choices, canned responses, no error handling



Adapted from MIT, 6.813

# Scenarios

- Hypothetical or fictional situations of use
  - Typically involving some person, event, situation and environment
  - Provide context of operation
  - Often in narrative form, but can also be sketches or even videos
- 
- Approach problem from another person's point of view
  - Can involve social and interpersonal aspects of the task
  - Can be very futuristic and creative
  - Facilitates feedback and opinions

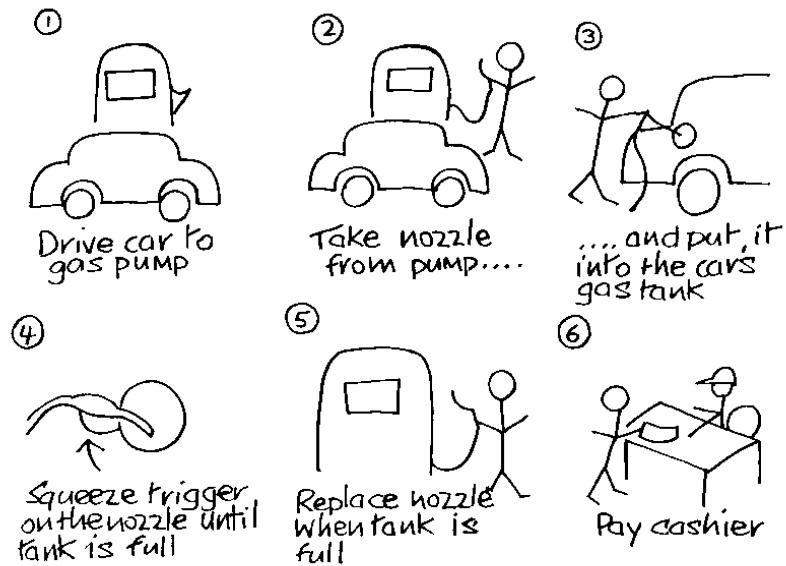
# More dimensions of fidelity

- Look: appearance, graphic design
  - Sketchy, hand-drawn
- Feel: input method
  - Pointing & writing feels very different from mouse & keyboard

# Low vs. High Fidelity Prototypes

- Low-Fi: Cheap to produce, does not realistically simulate the final product (focus on *conceptual design*)
- Hi-Fi: Increased similarity to final product, possibly even using the same “parts” (focus on *physical design*)
- Prototypes should shift from Low-Fi to Hi-Fi as project progresses

# Low vs. High Fidelity Prototypes



# Low-Fidelity Prototyping

- Uses medium unlike the final product (e.g. paper, cardboard)
- Quick, cheap and easy to modify
- Important early on to encourage creative flexibility and exploration of ideas during conceptual design



# Paper prototype

- Interactive paper mock-up
  - Sketches of screen appearance
  - Paper pieces show windows, menus, dialog boxes, dropdown list, etc
- Interaction is natural
  - Pointing with a finger = mouse click
  - Writing = typing
- A person simulates the computer's operation
  - Putting down and picking up pieces
  - Writing responses on “screen”
  - Describing effects that are hard to show on paper
- Low-fidelity in look and feel

# Benefits of paper prototyping

- Faster to build
  - Sketching is faster than programming
- Easier to change
  - Easy to make changes between user tests, or even during a user test
  - No code investment – everything will be thrown away (except the design)
- Focuses attention on big picture
  - Designer doesn't waste time on details
  - Customer makes more creative suggestions, not nitpicking
- Nonprogrammer can help
  - Only kindergarten skills are needed

Adapted from MIT, 6.813

# Tools for paper prototyping

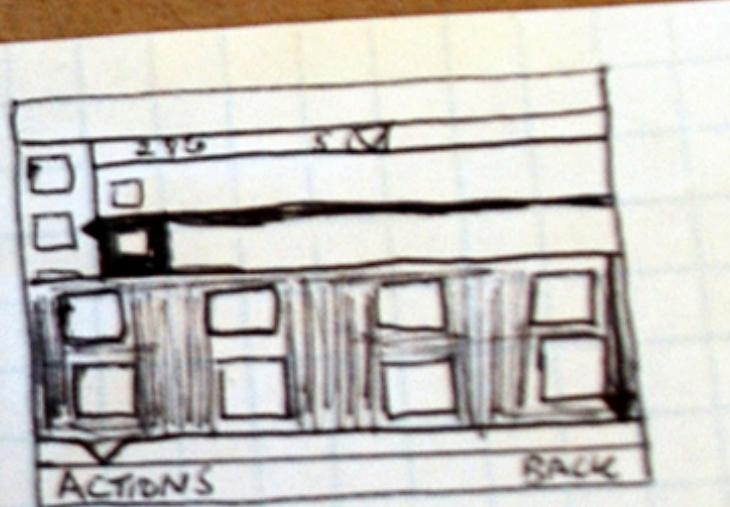
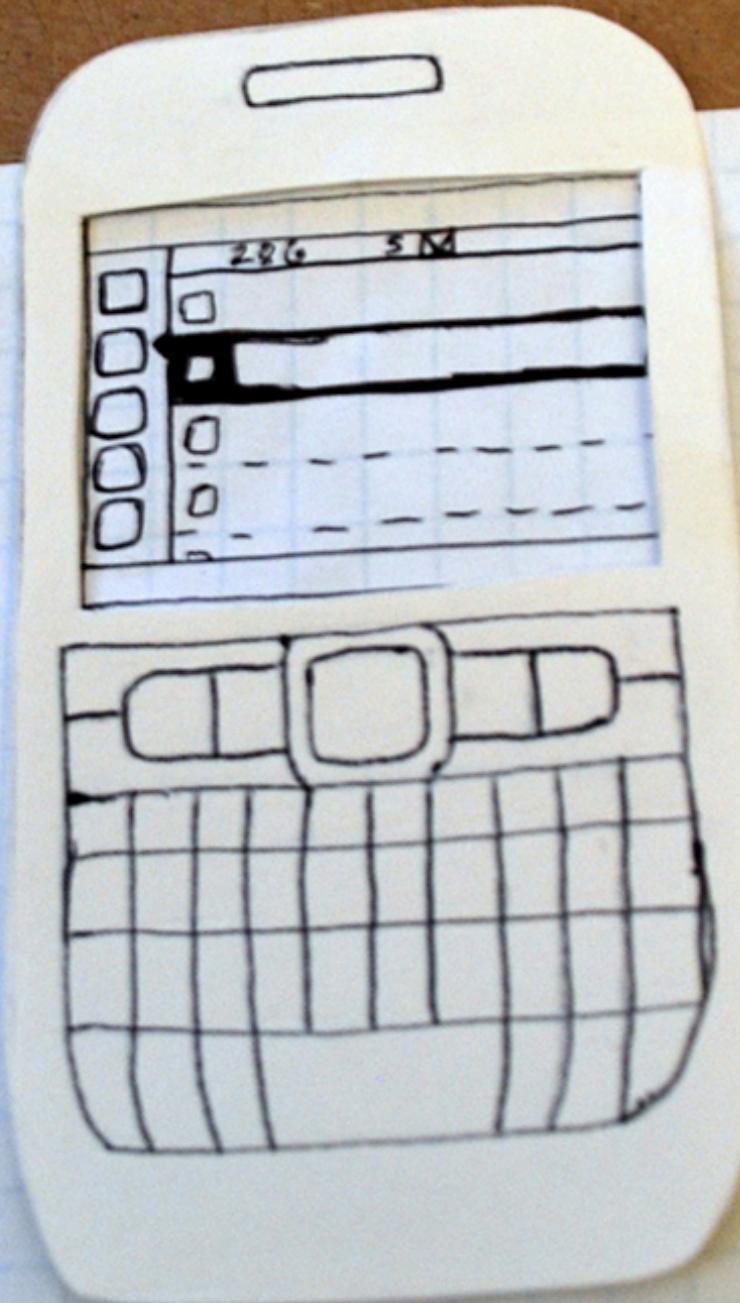
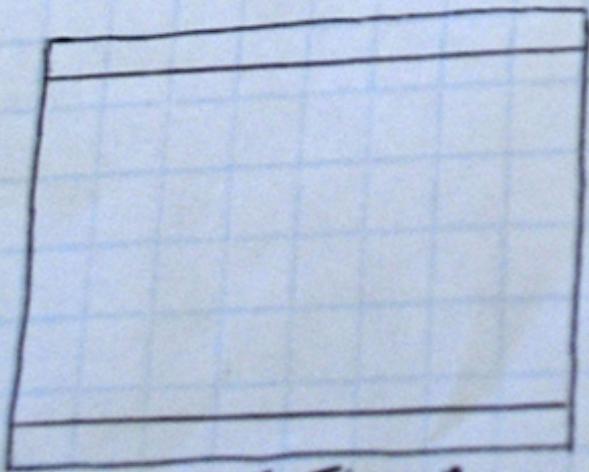
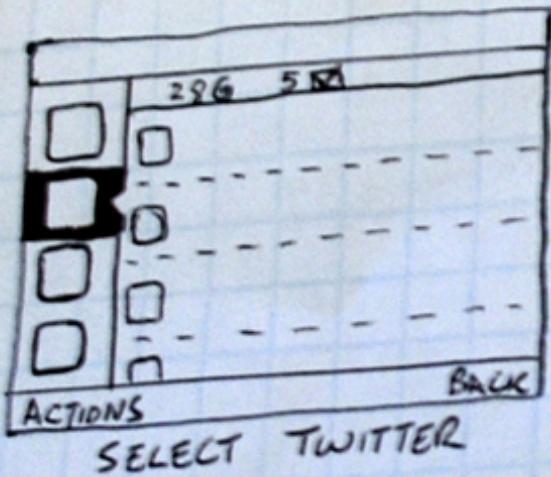
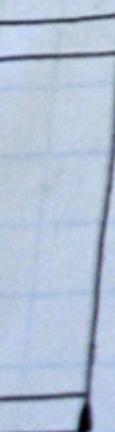
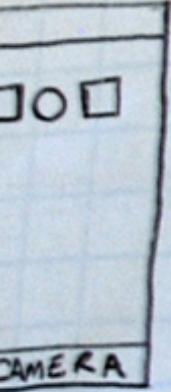
- White poster board
  - For background
- Big index cards
  - For menus, window content, dialog boxes
- Restickable glue
  - For keeping pieces fixed
- White correction tape
  - For text fields, checkboxes, short messages
- Overhead transparencies
  - For highlighting, user “typing”
- Photocopier
  - For making multiple copies
- Pens and markers, scissors, tape

# Tips for Good Paper Prototypes

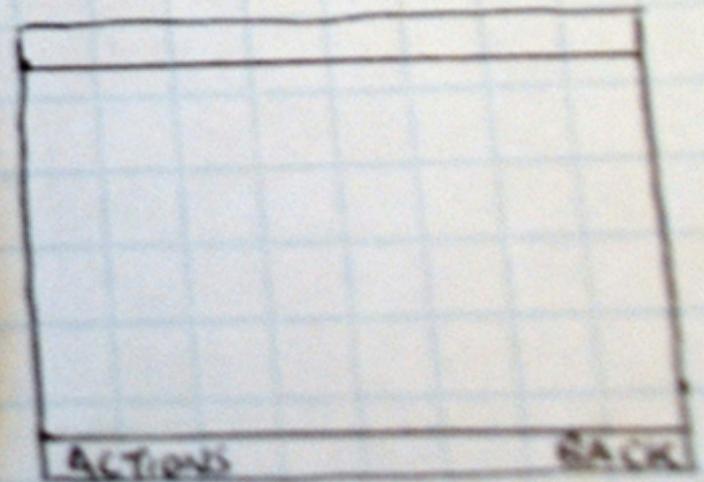
- Make it larger than real life
- Replace tricky visual feedback with audible descriptions
  - Tooltips, drag & drop, animation, progress bar
- Keep pieces organized
  - Use folders & open envelops

# Paper Prototypes

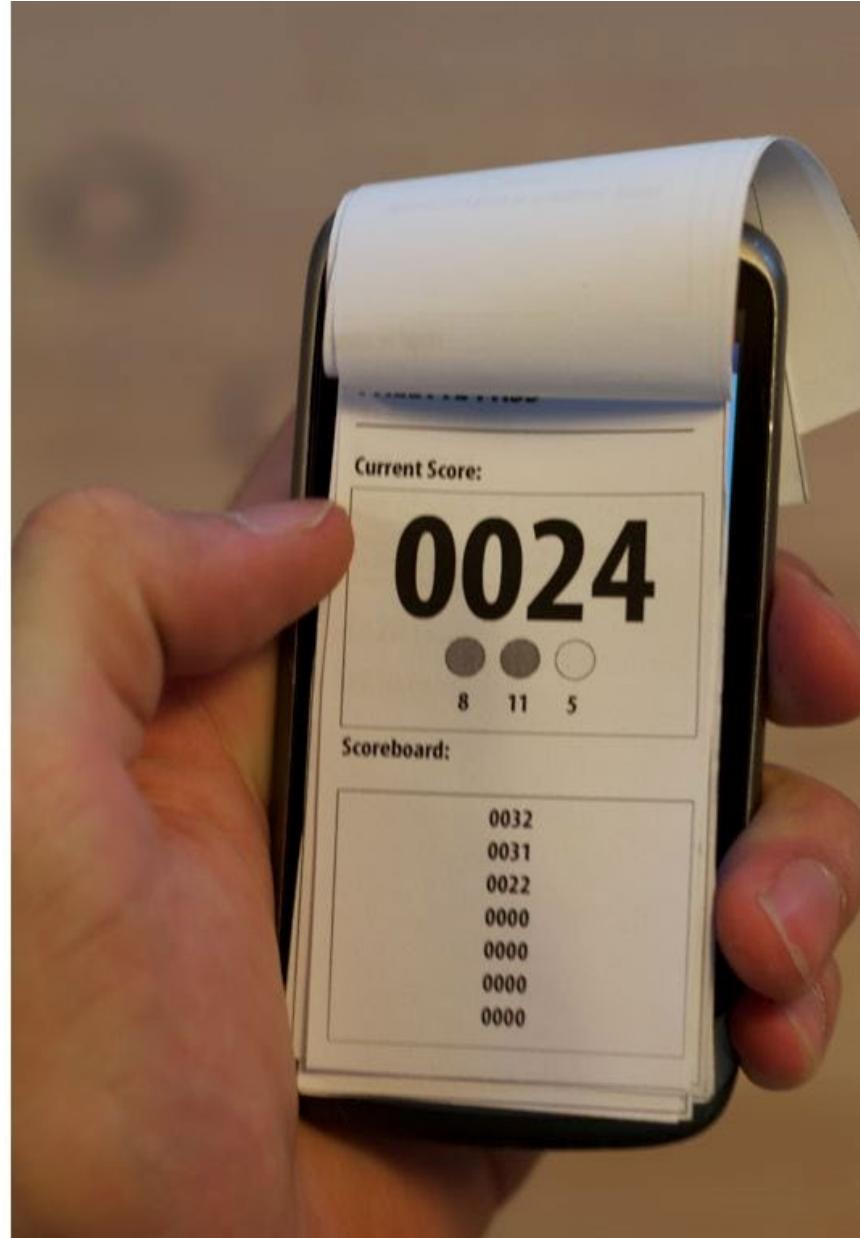


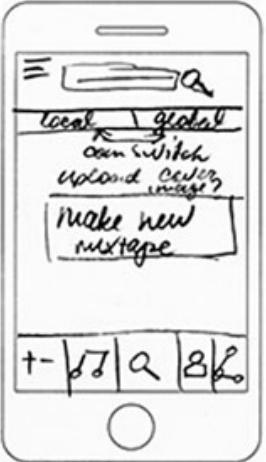
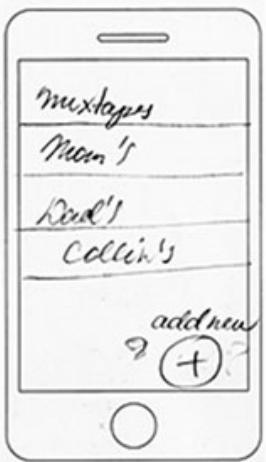
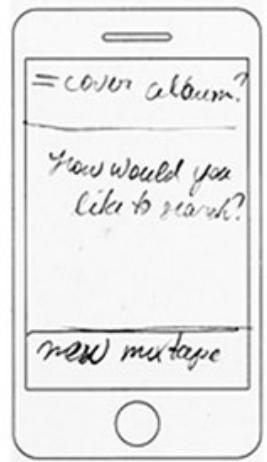
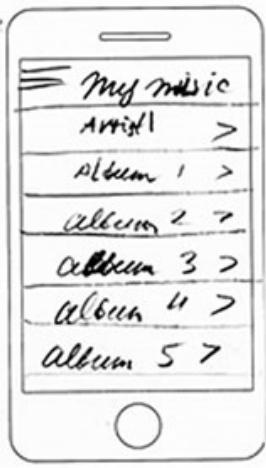
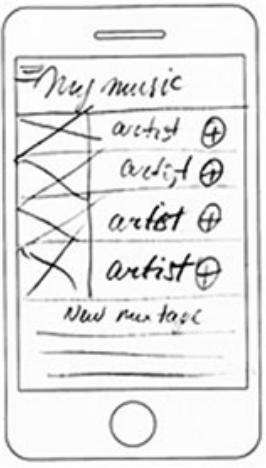
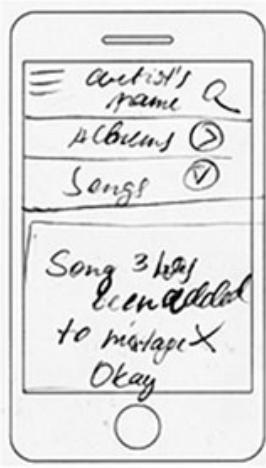
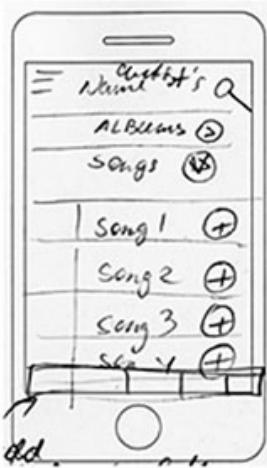
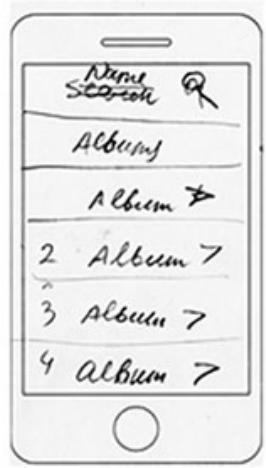


ACTIONS ON A TWEET



ACTIONS ON A FILTER





# Candyland

1

Search

5

CANDY

2

CHOCOLATE

VIEW CART

9

## NARROW YOUR SELECTION

### BY FLAVOR:

- FRUITY
- CARAMEL
- MINTY / SPICY

### BY TEXTURE:

- GUMMI
- TOFFEE
- HARD

### BY PRICE:

- UNDER 5
- 5-15
- ABOVE 15

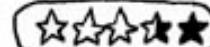
CHOCOLATE

CANDY



STRAWBERRY  
HARD CANDY, 16 OZ

PRICE = \$3.59



### PRODUCT DETAILS:

Strawberry flavor hard candy  
with real strawberries  
in each piece. Great for after  
meals or as a treat.

VIEW MORE DETAILS

7

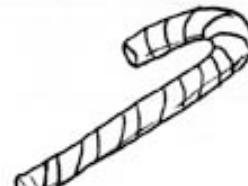
ADD TO CART

QTY

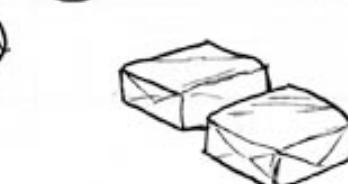
VIEW CART

6.1

9



Jelly Bean



Milk



Milk with Almond

4.8

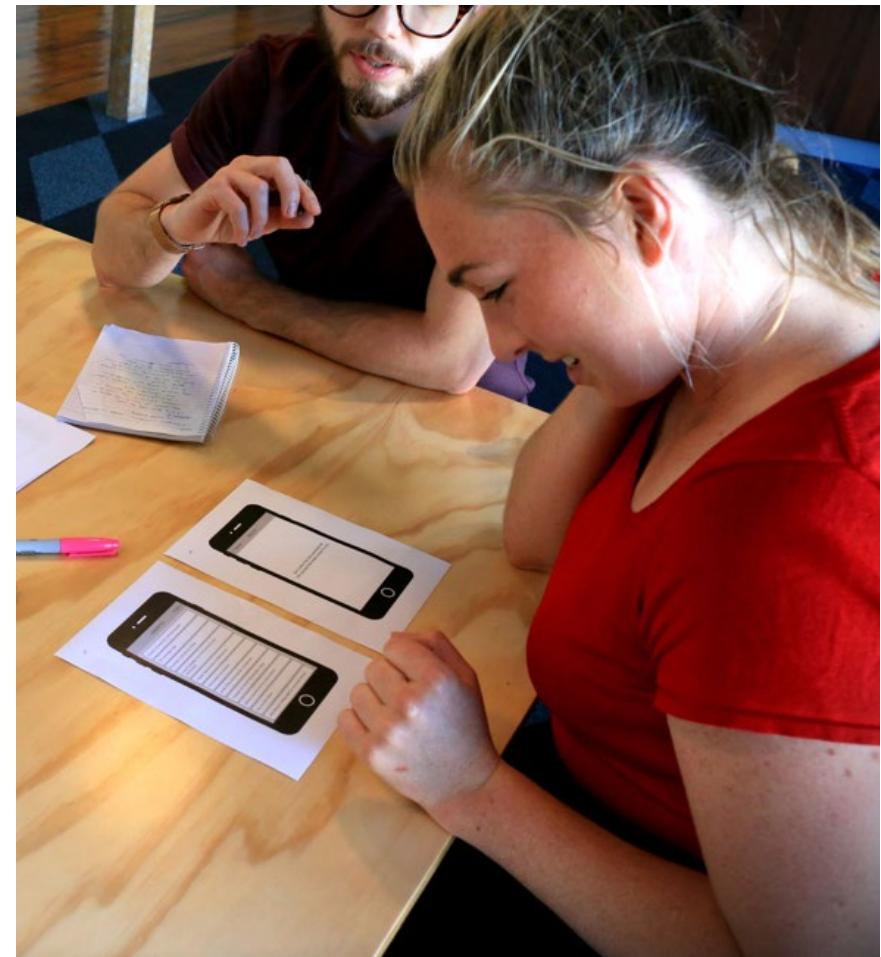
# Mobile Phone App Paper Prototype



<https://www.youtube.com/watch?v=jTytI1PkGFM>

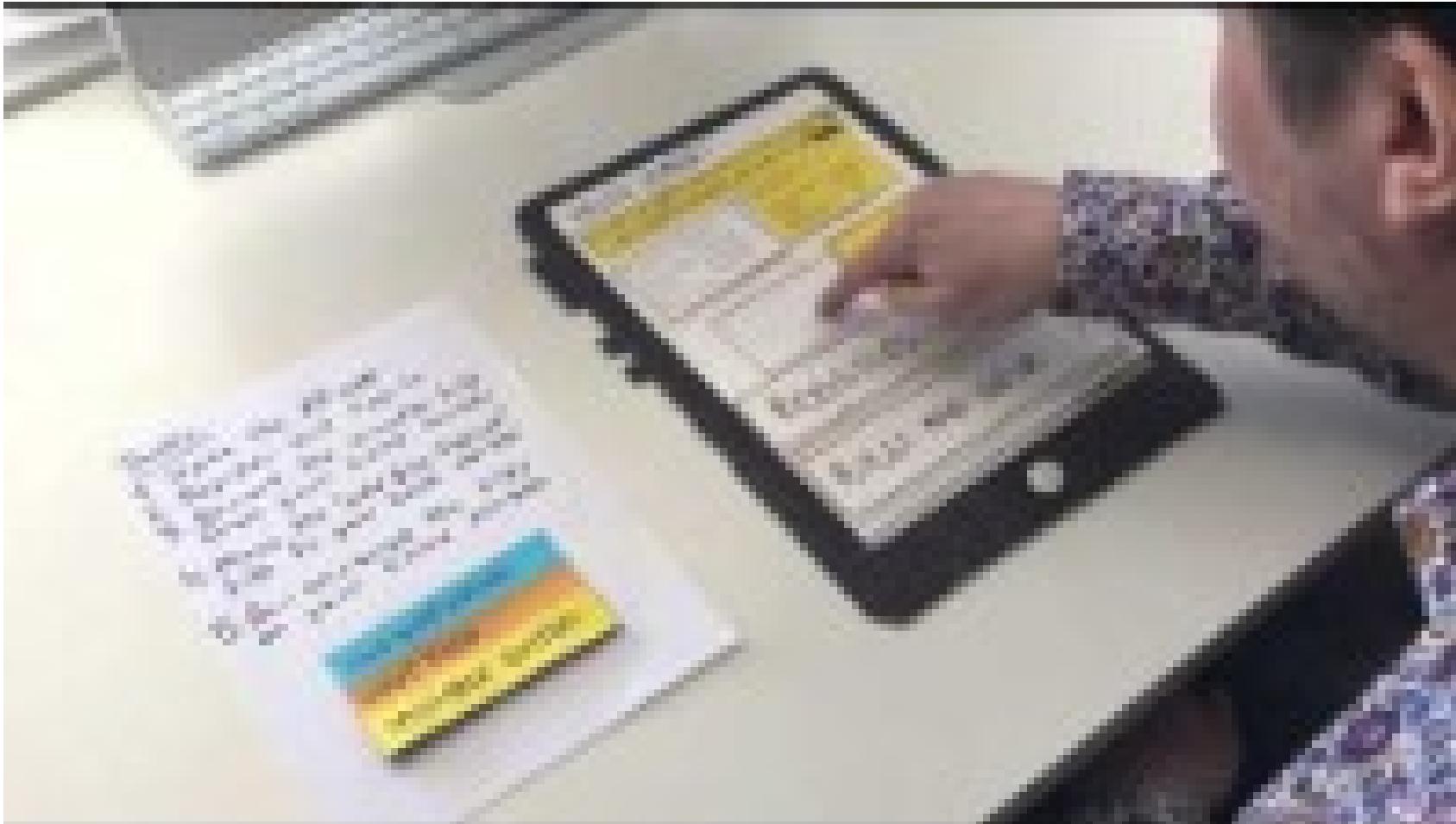
# Test Prototypes with People

- Test on multiple users and other stakeholders
- Test multiple prototypes simultaneously to get most value
- Emphasize conversation and “think aloud”





# Paper prototype testing



<https://www.youtube.com/watch?v=yafaGNFu8Eg>

# What to learn from paper prototype?

- Conceptual model
  - Do users understand it?
- Functionality
  - Does it do what's needed?
- Navigation & task flow
  - Can users find their way around?
  - Are information preconditions met?
- Terminology
  - Do user understand labels?
- Screen contents
  - What needs to go on the screen?

# What can't be learnt from paper prototype

- Look: color, font, whitespace, etc
- Feel: efficiency
- Response time

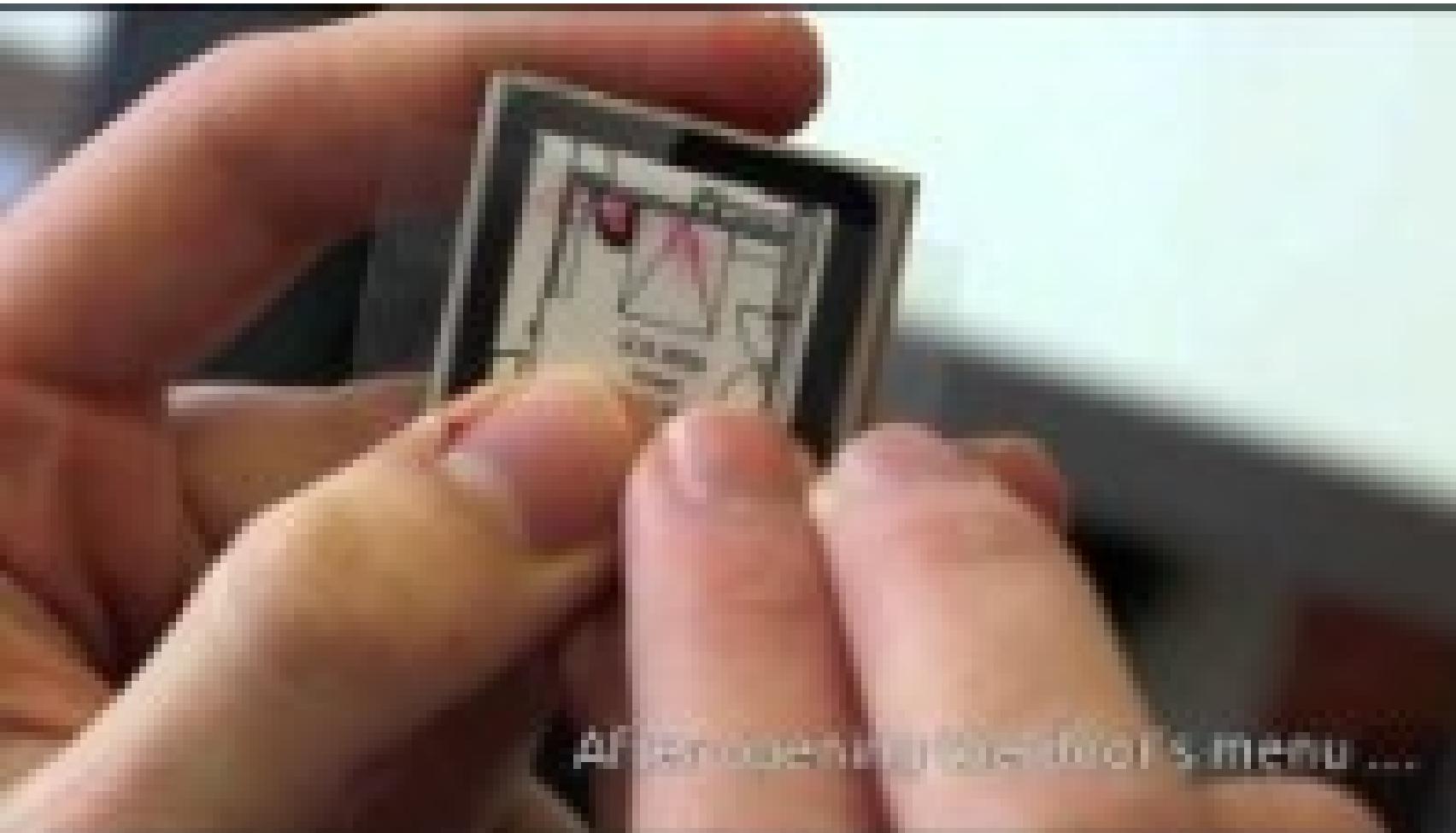
# Video Prototyping

- Used to illustrate how users will interact with a new system
- Often used to quickly represent design concepts that often involve complex relationships or require a high level of technology
- Like a storyboard, the *whole* task, including motivation and success
  - Establishing shots and narrative
  - Draw on tasks observed during needfinding
  - Illustrate important tasks the system enables
  - Can help scope a minimum-viable product

# Benefits of Video Prototyping

- Cheap and fast
- Great communication tools
  - Portable and self-explanatory
  - Helps to convey ideas to others
- Ties interface designs to tasks
  - Aligns and orients interface choices, how they will be used in real life
  - Ensures you have a complete interface (And that there's nothing extra)
- May serve as a specification for developers

# Video prototype



Architecture Watch App

<https://www.youtube.com/watch?v=bo5o7H--tRY>

# Video prototype

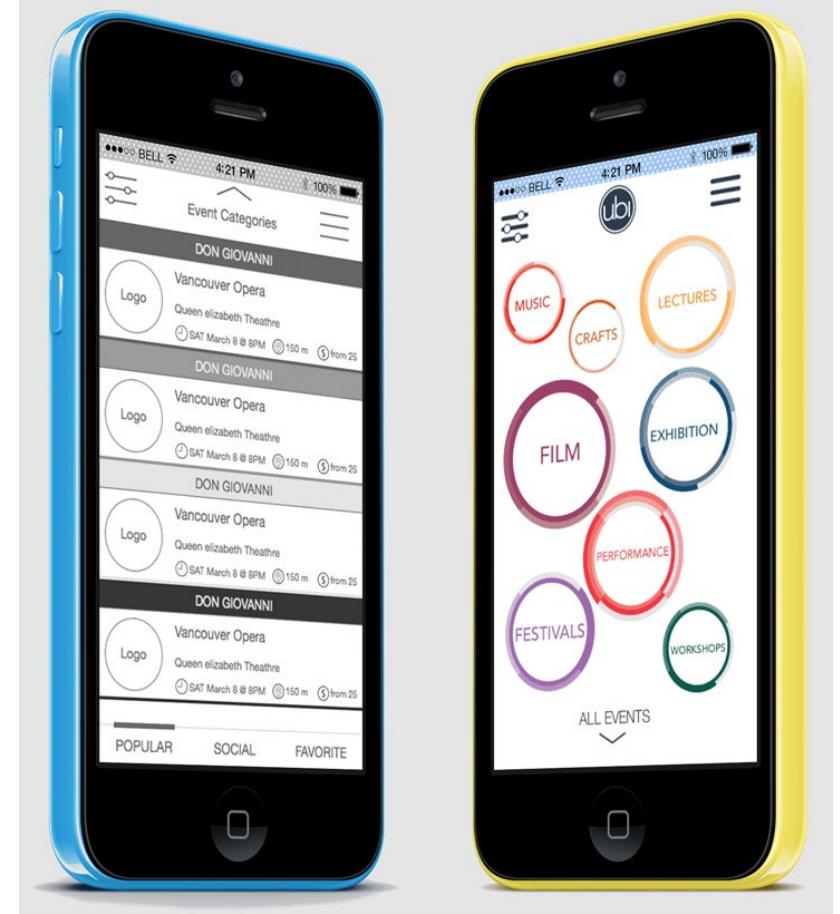
- KeyLess <https://vimeo.com/2837682>
- RaMo System <https://vimeo.com/3144130>

# Low to High-Fidelity Prototypes



# Computer prototype

- Interactive software simulation
- High-fidelity in look & feel
- Low-fidelity in depth
  - Paper prototype had a human simulating the backend; computer prototype does not;
  - Computer prototype may be horizontal
    - Covers most of the features
    - But no backend



# What to learn from computer prototype?

- Everything you learn from paper prototype, and PLUS
- Screen layout
  - Is it clear, overwhelming, distracting, complicated?
  - Can users find important elements?
- Colors, fonts, icons, other elements
  - Well-chosen?
- Interactive feedback
  - Do users notice & respond to status bar messages, cursor changes, other feedback
- Efficiency issues
  - Controls big enough?
  - Too close together?
  - Scrolling list too long?

# Why computer prototyping? (benefits)

- Faster than coding
- No debugging
- Easier to change or throw away

# Computer Prototyping Issues

- Can confuse boundary between prototype and real product
- Users confuse demo promise with real product; sets high expectations
- Software prototypes may have slow performance, bugs, etc.

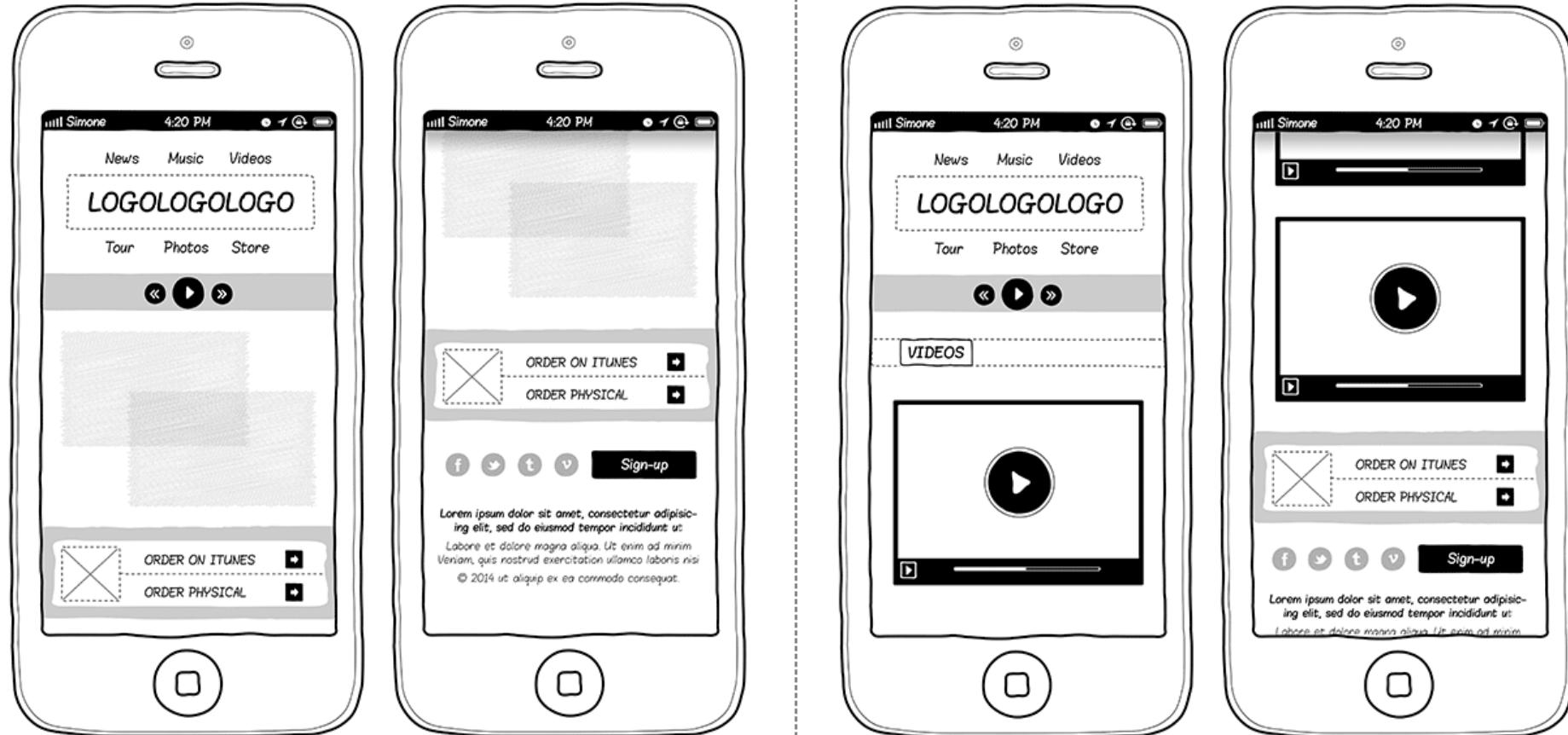
# Techniques for computer prototyping

- Form Builder
  - Real windows assembled from a palette of widgets (buttons, dialog boxes, labels, etc)
- Wizard of Oz
  - Computer frontend, human backend

# Form Builders

- WPF
- Qt
- Silverlight (for web)
- Mac Interface Builder
- Visual Basic
- C#.NET
- Wireframe (for mobile)
- ...

# Wireframes



<http://www.visual-paradigm.com/features/wireframing/>

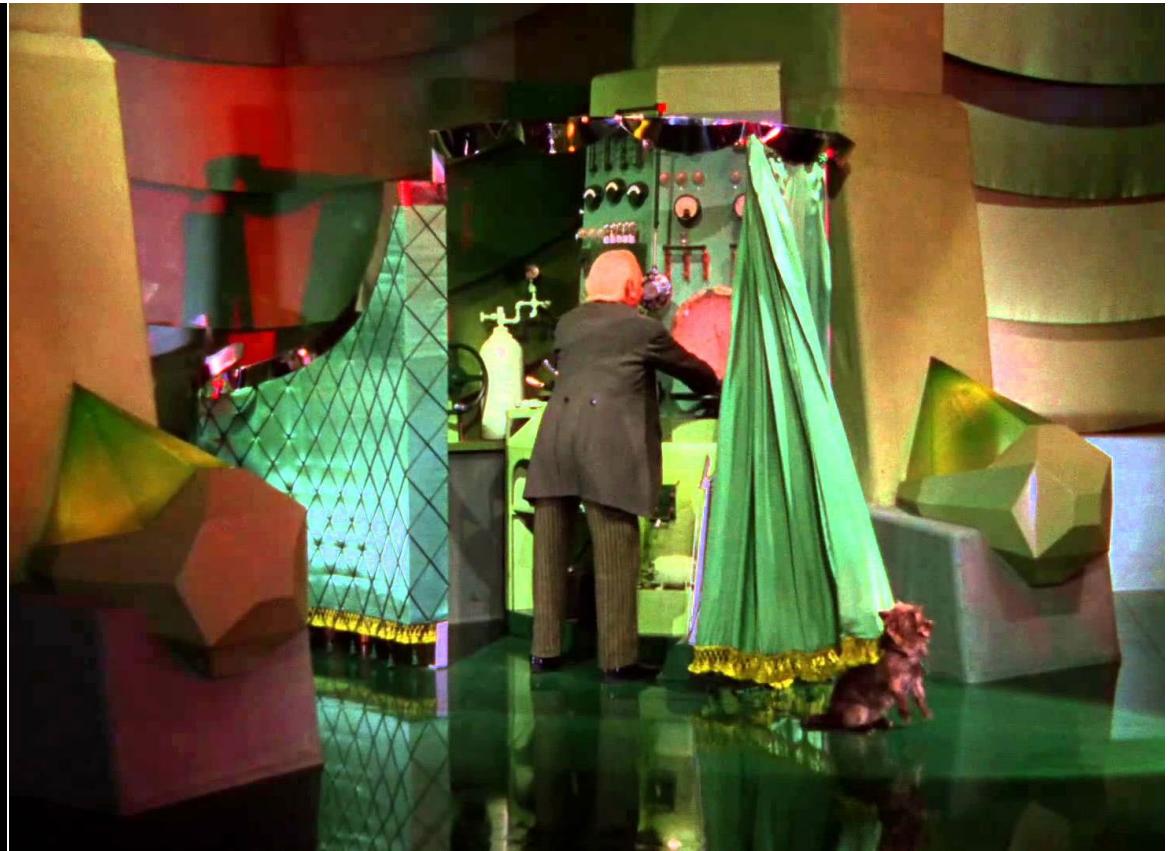
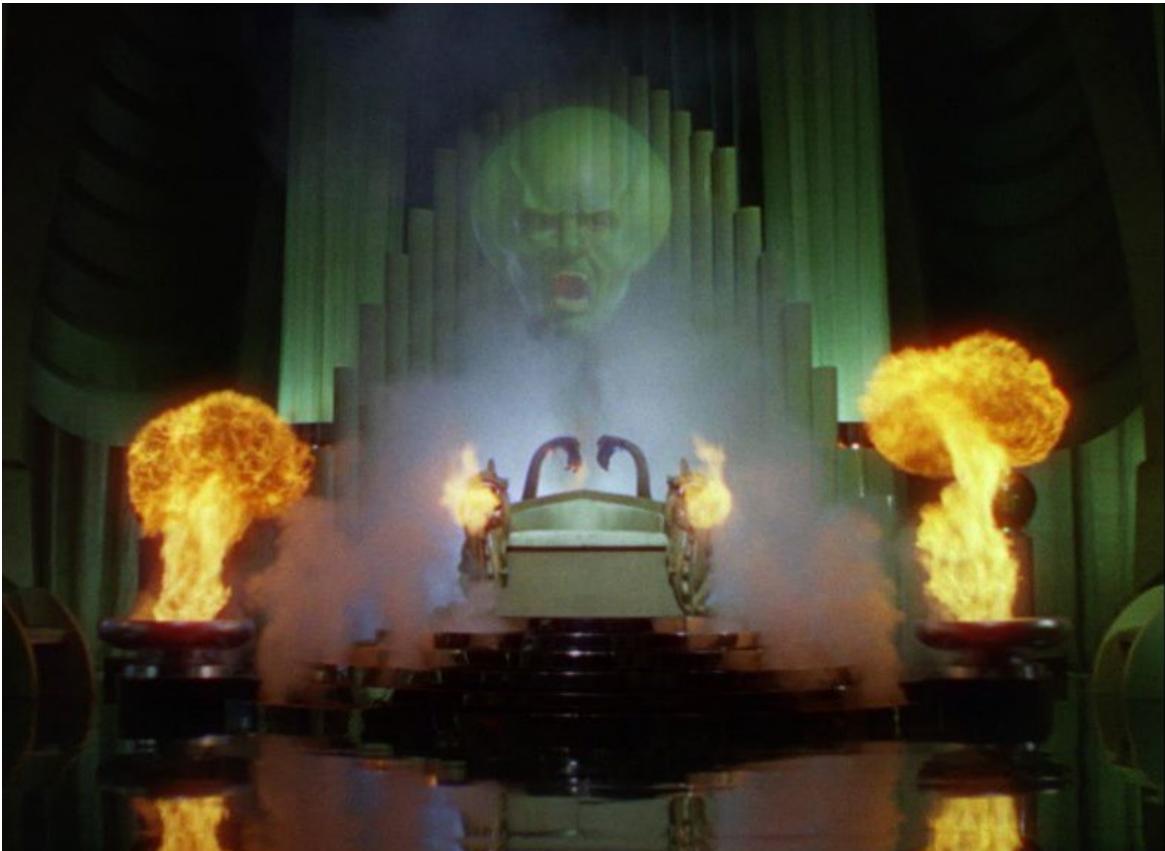
# Other Computer Prototyping Tools

- <http://www.justinmind.com>
- <http://www.axure.com/>
- <https://balsamiq.com/>
- <http://www.visual-paradigm.com/features/wireframing/>

# Pro & Cons of Form Builder

- Pros:
  - Actual control
  - Can hook in some backend code
    - Then you might not want to throw it away
- Cons
  - Limits thinking to standard widgets (lack of creativity)
  - Less helpful for rich graphical interfaces

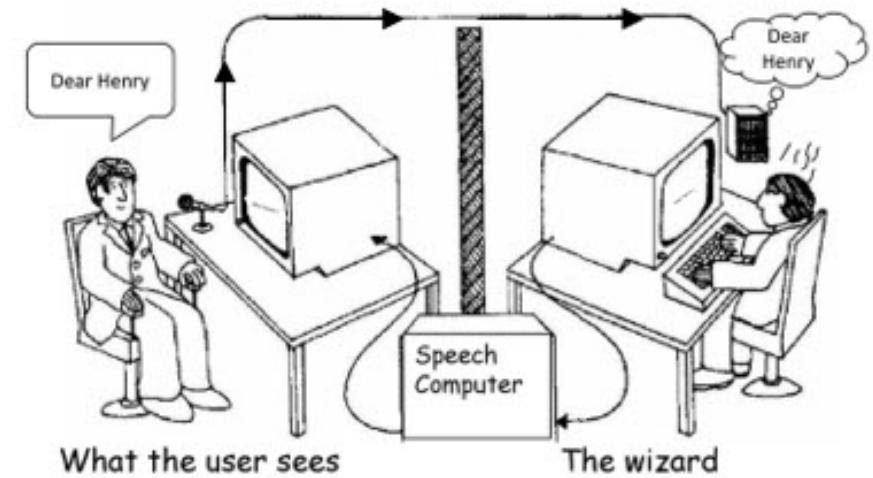
# Wizard-of-Oz



# Wizard-of-Oz Prototyping

- “Wizard-of-Oz” = “man behind the curtain”
- Simulate machine behavior with human operators
  - User thinks they are interacting with a computer, but a human is responding to the input
- Often used to simulate future technology
  - Natural language understanding
  - etc
- Allows for testing advanced functionality without full implementation

*Wizard of Oz testing – The listening type writer IBM 1984*



# Example

Apple Knowledge Navigator (1987)

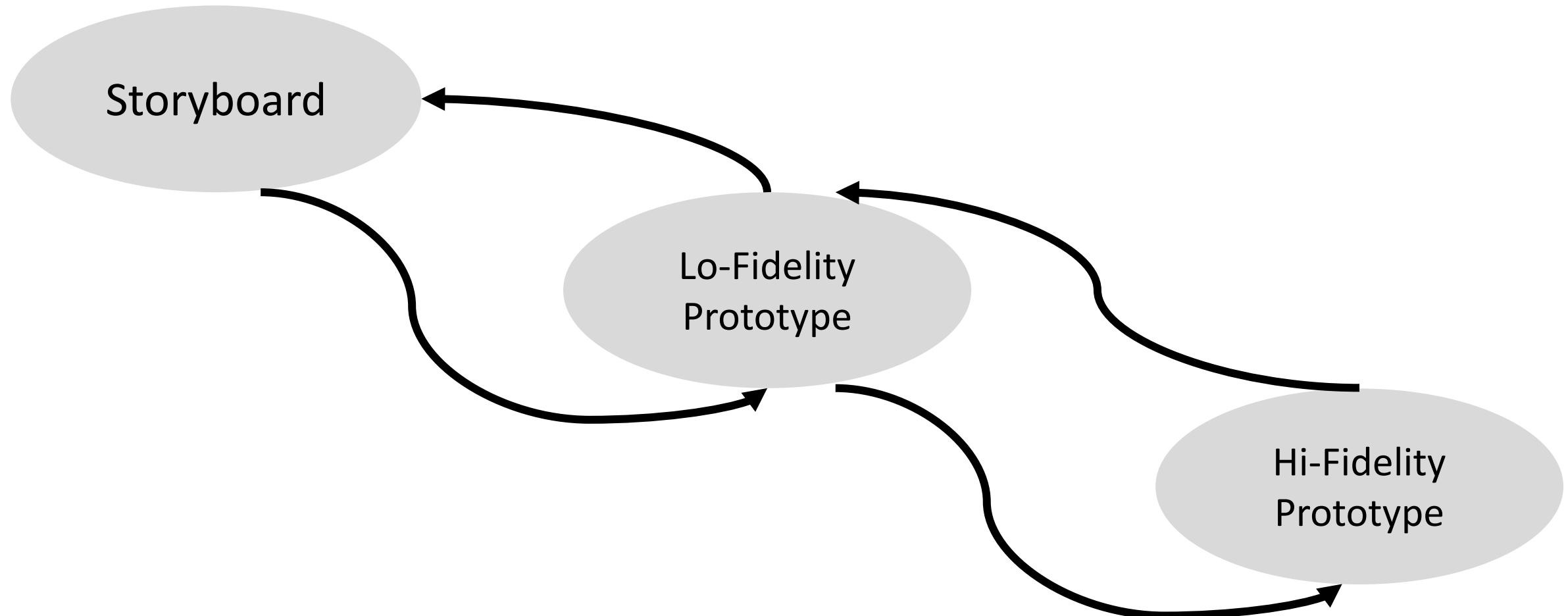


# Benefits of Wizard-of-Oz Prototyping

- More “realistics” than paper prototyping
- Identifies bugs and problems with current design
- Places the user at the center of development
- Can envision challenging-to-build applications
- Designers and developers learn by playing wizard

# Disadvantages of Wizard-of-Oz Prototyping

- May misrepresent otherwise imperfect technology
- May simulate technologies that do not exist (and may never)
- Wizards require training and can be inconsistent
- Playing the wizard can be exhausting
- Some features (and limitations) are difficult/impossible to simulate effectively
- May be inappropriate or inconvenient in some venues (e.g. home)



# Summary

- A prototype is a rapid approximation of a design idea used to gather feedback
- Prototypes are cheap, simulate the design in a low-cost manner and can be rapidly created based on different ideas
- Paper prototype
- Video prototype
- Computer prototype